

**State Revolving Fund Project Plan
Rehabilitation of Ashland Relief, Linwood, Second Avenue,
and Shiawassee Sewers**



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1.0 PROJECT BACKGROUND

This document has been prepared for the SRF low interest loan program in accordance with the Clean Water State Revolving Fund (SRF) Project Plan Preparation Guidance adopted by the Michigan Department of Environment, Great Lakes, and Energy (EGLE; Revision 1/2023). It is the intent of the Great Lakes Water Authority (GLWA) to seek low interest loan assistance for quarter 1 of the 2027 fiscal year under the SRF program. The purpose of this document is to describe the GLWA project that is the basis for this request for SRF funding, including details of the project as required by the SRF Project Plan Guidance document.

The GLWA wastewater conveyance system consists of over 180 miles of large diameter collector and interceptor sewers which convey wastewater flows from member communities outside Detroit to the Water Resource Recovery Facility (WRRF) located in southwest Detroit. The assets to be rehabilitated under GLWA Contract 2201041: Rehabilitation of GLWA Sewers includes the Ashland Relief, Linwood, Second Ave., and Shiawassee Sewers. These four sewers are collectively referred to as AL2S. Further background details regarding these sewers are discussed in Sections 1.0.1 through 1.0.4.

The goal of the project is to rehabilitate and repair structural defects within the AL2S Sewers to extend the service life of these assets by another 30 years. The approximate locations of the various sewers are shown in Figures 1 through 5 on the following pages. This project plan discusses the need for the project, alternative options that have been considered, recommended alternatives, and environmental impacts of the project. This document also serves as the basis for public review and comment on the proposed work in accordance with the public participation requirements of the SRF program.

1.0.1 Ashland Relief Sewer

The Ashland Relief Sewer is a 9,168-foot long, 16-foot diameter cast-in-place concrete sewer constructed in 1961. The sewer was constructed using tunneling methods with a rib and lagging primary liner and 20-inch concrete secondary liner and extends from the intersection of Manistique St. and Kercheval Ave. to the Freud Pump Station (PS). This sewer also has a chamber connecting it to the East Jefferson Relief Sewer (EJRS) via two 10-foot diameter tunnels with three 6-foot diameter portal holes in each. The Ashland Relief Sewer splits into two 11.5-foot barrels below the EJRS before transitioning back to a 16-foot diameter pipe.

1.0.2 Linwood Sewer

The Linwood Sewer is a 15,882-foot-long sewer that ranges from a 3-foot x 4.5-foot egg-shaped brick sewer to a 9.5-foot circular-shaped brick sewer with several intermediate size changes and material changes from brick to concrete. The sewer was constructed in-tunnel in 1921 and extends from the intersection of Log Cabin St. and Puritan Dr. to the intersection of Linwood St.

and Edison St. This sewer conveys flow from many DWSD-owned lateral connections to the Joy Rd. Sewer.

1.0.3 Second Avenue Sewer

The Second Avenue Sewer was constructed in 1931 and consists of a 3,485-foot-long brick egg-shaped sewer that ranges from 2.8-foot x 3.5-foot to 3.2-foot x 4.75-foot in size. Approximately 1,009 feet of this sewer has previously been lined with a cured-in-place-pipe (CIPP) liner. The Second Avenue Sewer conveys flow from local DWSD-owned laterals to the GLWA-owned Joy Road Sewer. Additionally, an alley sewer connecting to the Second Ave. Sewer is included in the project scope. This alley sewer, referred to in GLWA's GIS system as the Highland Park Laterals Sewer consists of approximately 4,875 feet of 12-inch to 22-inch vitrified clay pipe. This alley sewer has nearly 180 direct residential and stormwater connections and extends from Hamilton to the west to Brush to the east at the boundary of Highland Park and Detroit.

1.0.4 Shiawassee Sewer

The Shiawassee Sewer is a 12,420-foot-long sewer constructed in-tunnel in 1930. The Shiawassee Sewer conveys flow from the GLWA-owned Seven Mile Sewer and DWSD-owned Shiawassee Sewer at its upstream end, the GLWA-owned West Six Mile Sewer, and many DWSD-owned connections along its alignment to the Puritan-Fenkell CSO Retention Treatment Basin (RTB) Facility. The sewer begins as a 4.25-foot brick sewer and has several size and material changes until it transitions to a 12-foot diameter precast concrete pipe for the final 2,900 feet of its alignment upstream of the Puritan-Fenkell CSO RTB Facility. This precast pipe was installed using open-cut methods in 1995 as part of the Puritan-Fenkell CSO RTB Facility construction.

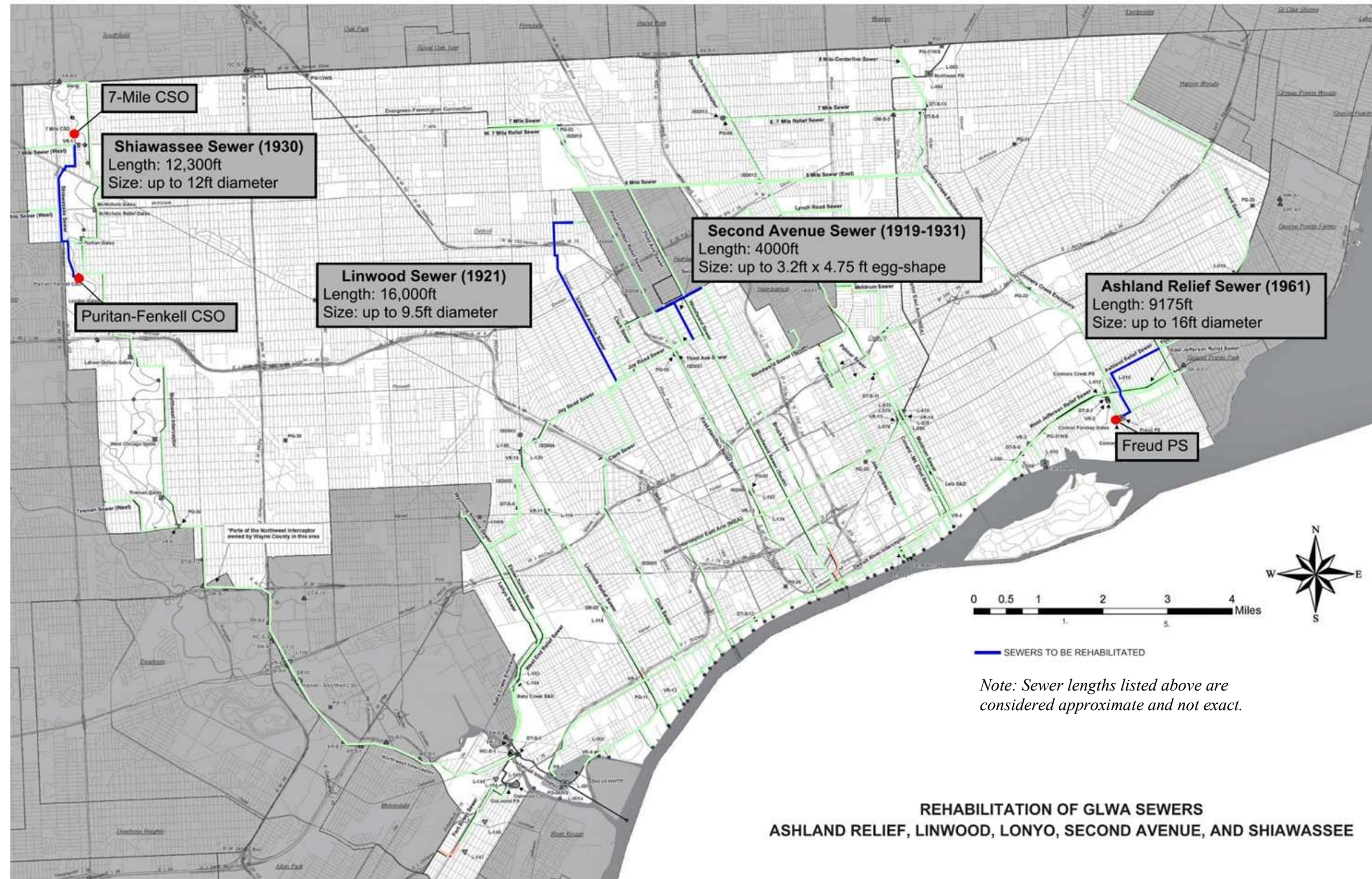


Figure 1: Overall Location Plan



Figure 2: Ashland Relief Sewer



Figure 3: Linwood Sewer



Figure 4: Second Ave. Sewer



Figure 5: Linwood Sewer

1.1 Delineation of the Study Area

The area of study for this project is located throughout the City of Detroit. The areas directly impacted by this project are shown in Figure 6 below. The areas directly impacted include portions of the City of Detroit, the City of Highland Park, the Grosse Pointes, Harper Woods, Eastpointe, Roseville. The area indirectly impacted by this project is estimated to be the rest of the City of Detroit.

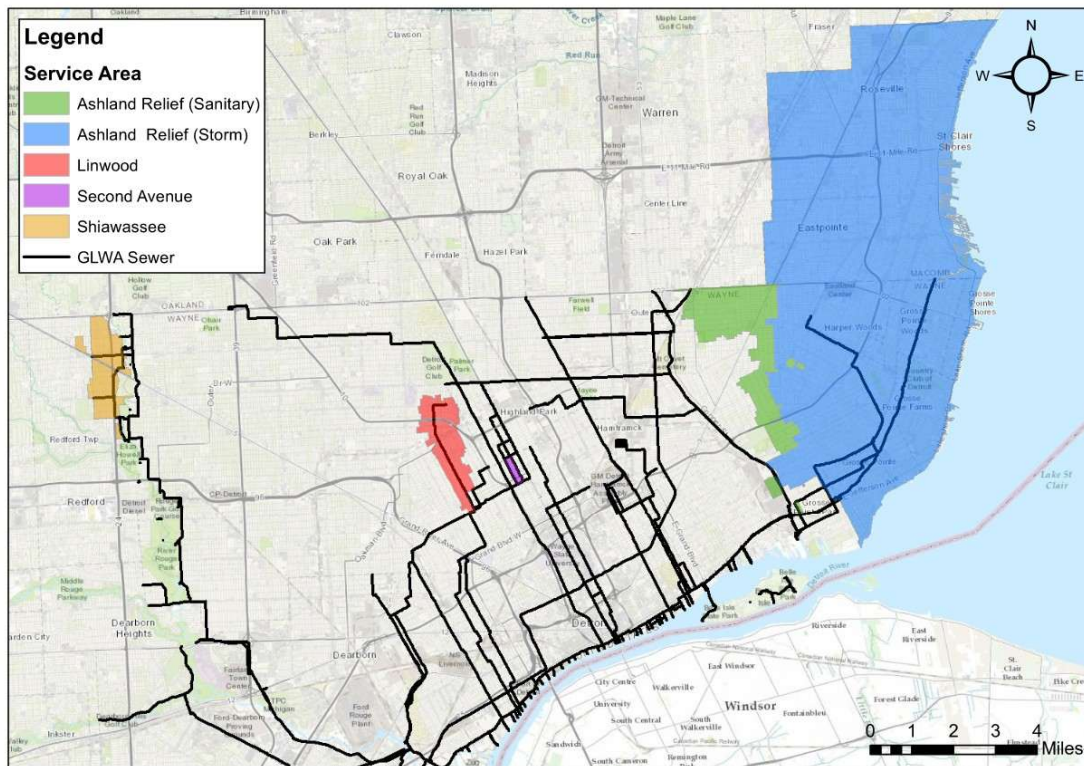


Figure 6: Service Area Directly Impacted by AL2S Sewers

The specific location of the AL2S Sewers in this project is shown in the 90-percent design drawings for the project attached as Appendix A. The at-grade areas affected are generally within the driving lanes along the alignment of the sewers. At-grade construction disturbance will consist of manhole frame and cover replacement which is limited to an approximately 8-foot by 8-foot area centered on each manhole structure.

1.2 Environmental Setting

The environmental setting of the study area is discussed in the following sections.

1.2.1 Cultural Resources

Kidorf Preservation Consulting and their subcontractor, Arbre Croche Cultural Resources LLC (ACCR), are currently preparing a State of Michigan Section 106 application for this project to evaluate the possible impacts to scientific, prehistorical, historical, or archeological resources in

the vicinity of the project. The final report from Kidorf is not complete at the time of this draft project plan report. Therefore, items required under the Section 106 review, including the final Kidorf report and required attachments will be included at the time of the final report under Appendix B.

Twelve federally recognized Indian tribes in Michigan were contacted during the development of this project plan. The Tribal Historic Preservation Officer (THPO) for each tribe was given the opportunity to comment on the project. The THPO contacts were provided with a summary of the project and a location plan of the project areas. The Notice of Opportunity to Comment Letters and responses that have been received are included in Appendix B. From the responses received, it does not appear that this project will have any effect on recorded resources or cultural resources.

1.2.2 The Natural Environment

Considerations to the natural environment in the study area are discussed in the following sections.

1.2.2.1 Air Quality

Direct or indirect air pollutant emissions are not expected to result from the operation of this project. Air pollutant emissions that will result from this project are limited to the construction phase of this project. This project will not impact contract capacity for any of the upstream sewer system wholesale customers and therefore is not expected to result in any population growth in the area that could impact long-term air quality.

As part of our efforts to analyze whether this project will impact air quality in the project area, the EGLE Air Quality Annual Report for 2024 was reviewed. The entire state of Michigan is in attainment for CO, Pb, NO₂, and particulate matter. The project area is in nonattainment for SO₂ and O₃. The levels for all criteria pollutants have continually decreased since monitoring began in the 1970s, and this project is not expected to affect the continually decreasing levels.

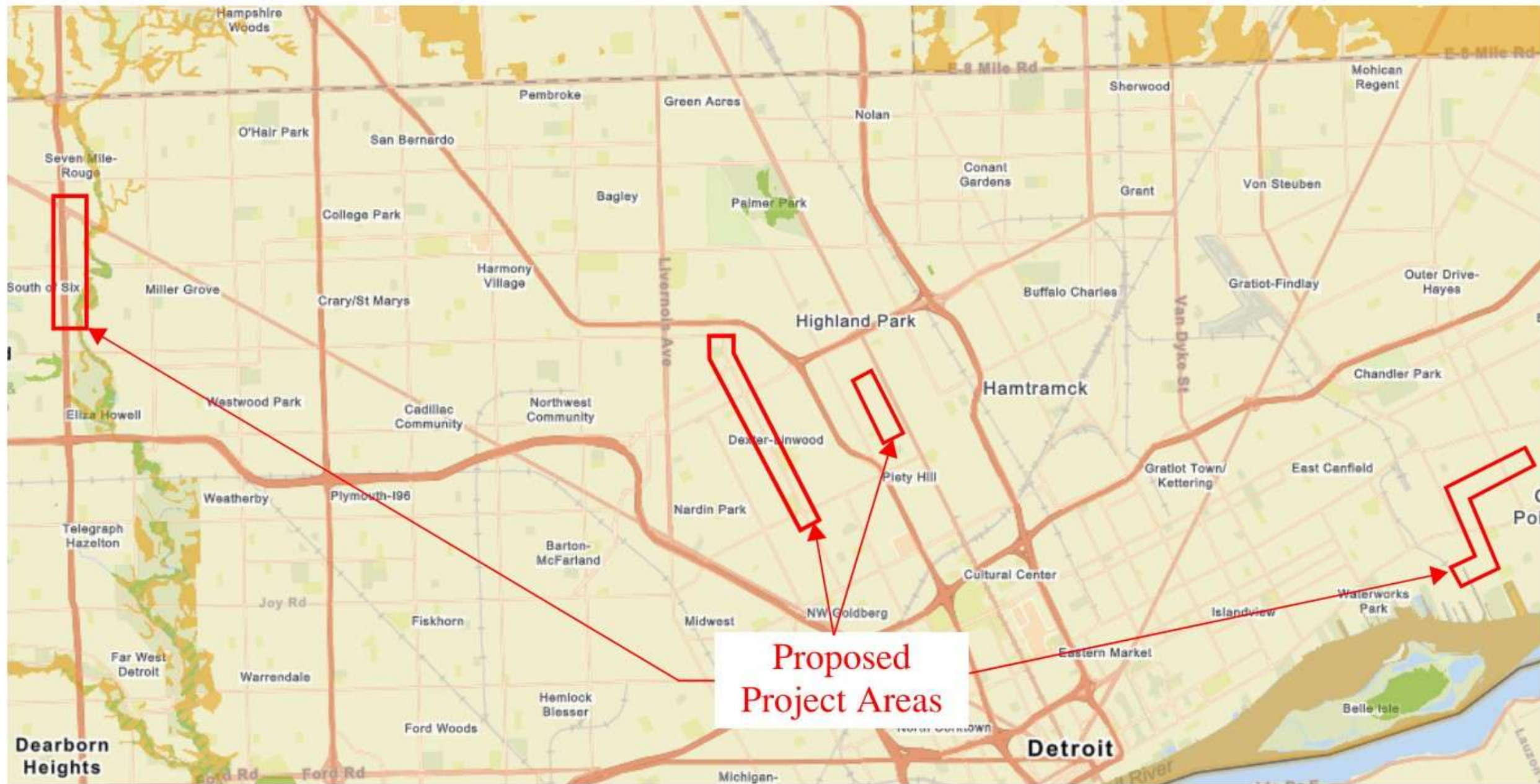
1.2.2.2 Wetlands

According to Michigan's wetland statute, Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, defines a wetland as "land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh."

To evaluate the potential effects of the project on wetlands in the area, the design team utilized the EGLE wetlands map viewer. The wetlands in the specific construction area are shown in Appendix C as Figures 1 through 4, and the wetlands in the entire project study area is shown in Figure 7 on the following page. Portions of the Shiawassee Sewer run parallel and partially into

wetlands at the Rouge River for approximately 3,000 feet and the Shiawassee Sewer overall is less than one mile away from wetland area. The Ashland Relief Sewer, Linwood Sewer, and Second Avenue Sewer have no wetlands in the construction areas as identified in the Part 303 Final Wetlands Inventory and MIRIS map or the 2005 National Wetlands Inventory. With the proposed minimal above-ground improvements and the below-ground work being trenchless, negative impacts to any of the wetlands identified near the project areas are not expected.

Wetlands Map Viewer



Part 303 Final Wetlands Inventory

- Wetlands as identified on NWI and MIRIS maps
- Soil areas which include wetland soils
- Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils

National Wetlands Inventory 2005

- Freshwater Pond
- Riverine

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Disclaimer: This map is not intended to be used to determine the specific

Figure 7: Wetlands map from EGLE Wetland Identification Program with respect to proposed project areas.

1.2.2.3 Coastal Zones

The Wayne County coastal map provided by EGLE (Figure 8) shows the boundaries for the Coastal Zone Management. None of the project construction areas are within the Coastal Zone Management Area where it extends inland along the Rouge River. EGLE administrates permits for activities within the coastal zone for the protection of high-risk erosion and critical dune areas. High-risk-erosion and critical dune areas are primarily located on the west shoreline of the state, in the upper peninsula, and in select areas on the shore of Lake Huron. This project is not in any high-risk-erosion or critical dune areas, and there are no coastal wetlands of concern in the project study area.

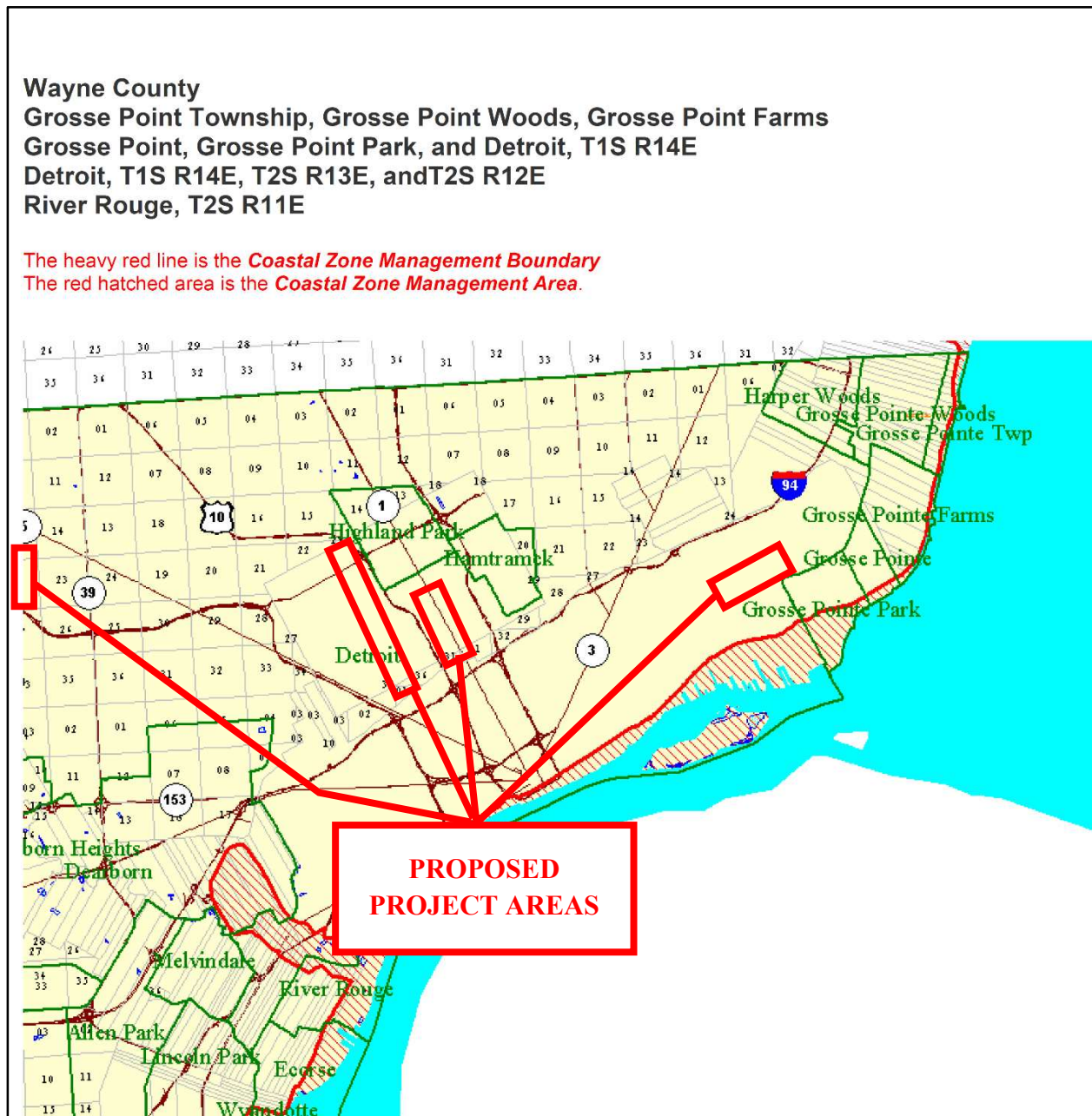


Figure 8: Wayne County Coastal Zone Boundary Map provided by EGLE with Project Areas Highlighted

1.2.2.4 Floodplains

The project areas have been evaluated for floodplain hazards using the Federal Emergency Management Agency (FEMA) Flood Map Service Center available online. Due to the large geographical size of the project, the floodplain maps with the project areas highlighted in relation to flood hazard zones have been included in Appendix C as Figures 5 through 11. After reviewing the floodplain maps, it appears that a portion of the Shiawassee Sewer is located within the Rouge River floodplain. Because most work is anticipated to be underground through existing access points, the majority of the work within the existing floodplain is not anticipated to negatively impact the floodplains. However, some limited above-ground work such as manhole rehabilitation will take place within the floodplain. For the remaining Ashland Relief, Linwood, and Second Avenue Sewers, it appears that above and below ground construction is not located within the identified floodplain locations, and activities are not anticipated to negatively impact any floodplains.

1.2.2.5 Natural or Wild and Scenic Rivers and Major Surface Waters

The rivers and major surface waters located near the project area are shown in Figure 9: Wayne County Watershed Map. This map indicates that the project area is in the Rouge River Watershed and the Detroit River Watershed. The Rouge River Watershed is broken down into 7 watersheds. Figure 10 shows that the Shiawassee Sewer, Linwood Sewer, and Second Avenue Sewer are solely in the Main 3-4 Rouge River watershed. The Ashland Relief Sewer is solely in the Detroit River Watershed. The major surface waters near the project area are the Detroit River and the Rouge River. These rivers are developed waterways with extensive urban, commercial, and industrial facilities along the shorelines, within the vicinity of the project.

The points where water is drawn for public and industrial use are shown on Figure 11: Water Intakes Map provided from the GLWA GIS system. This map shows the water intake locations on the Detroit River for Water Works Parks, Springwells, Northeast, and Southwest Water Treatment Plants, and the Ford Raw Water Intake Tunnel on the Rouge River.

The National Wild and Scenic Rivers System website indicates that sixteen different rivers in the State of Michigan have the designation of wild & scenic. These rivers are generally located in the northern portion of Michigan's Lower Peninsula and Michigan's Upper Peninsula, and it is not expected that this project will adversely impact any of the designated river segments.

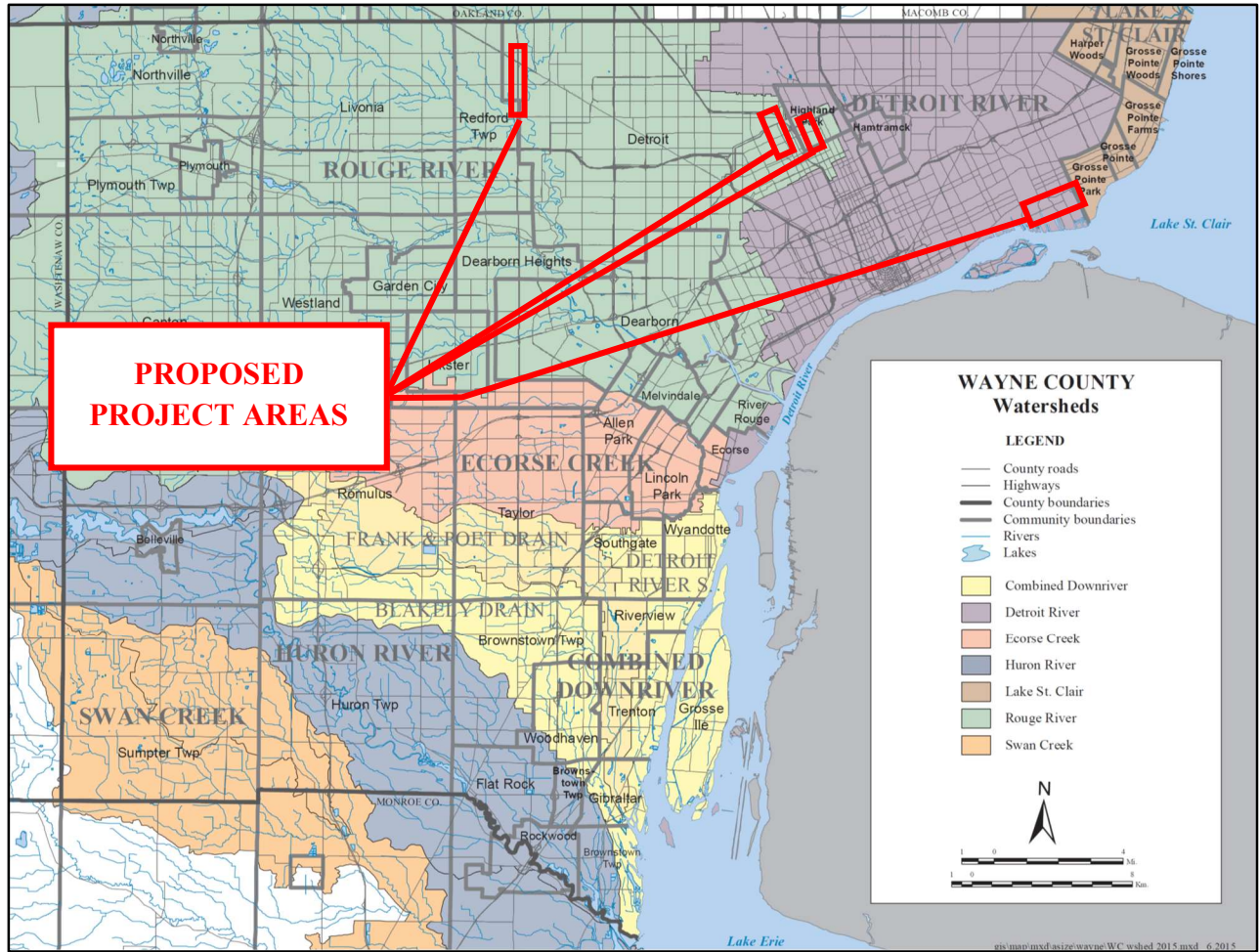


Figure 9: Wayne County Watershed Map in relation to project areas.

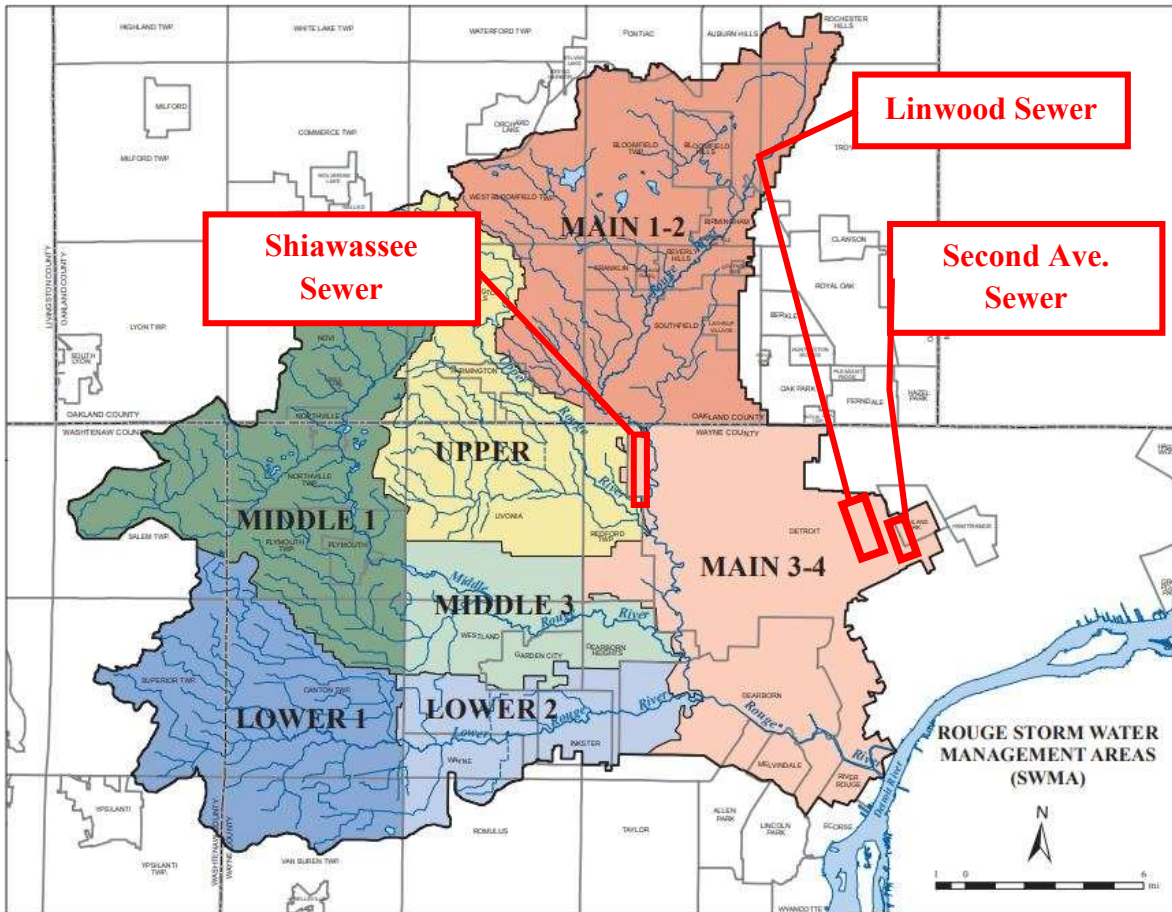


Figure 10: Rouge River Watershed Map

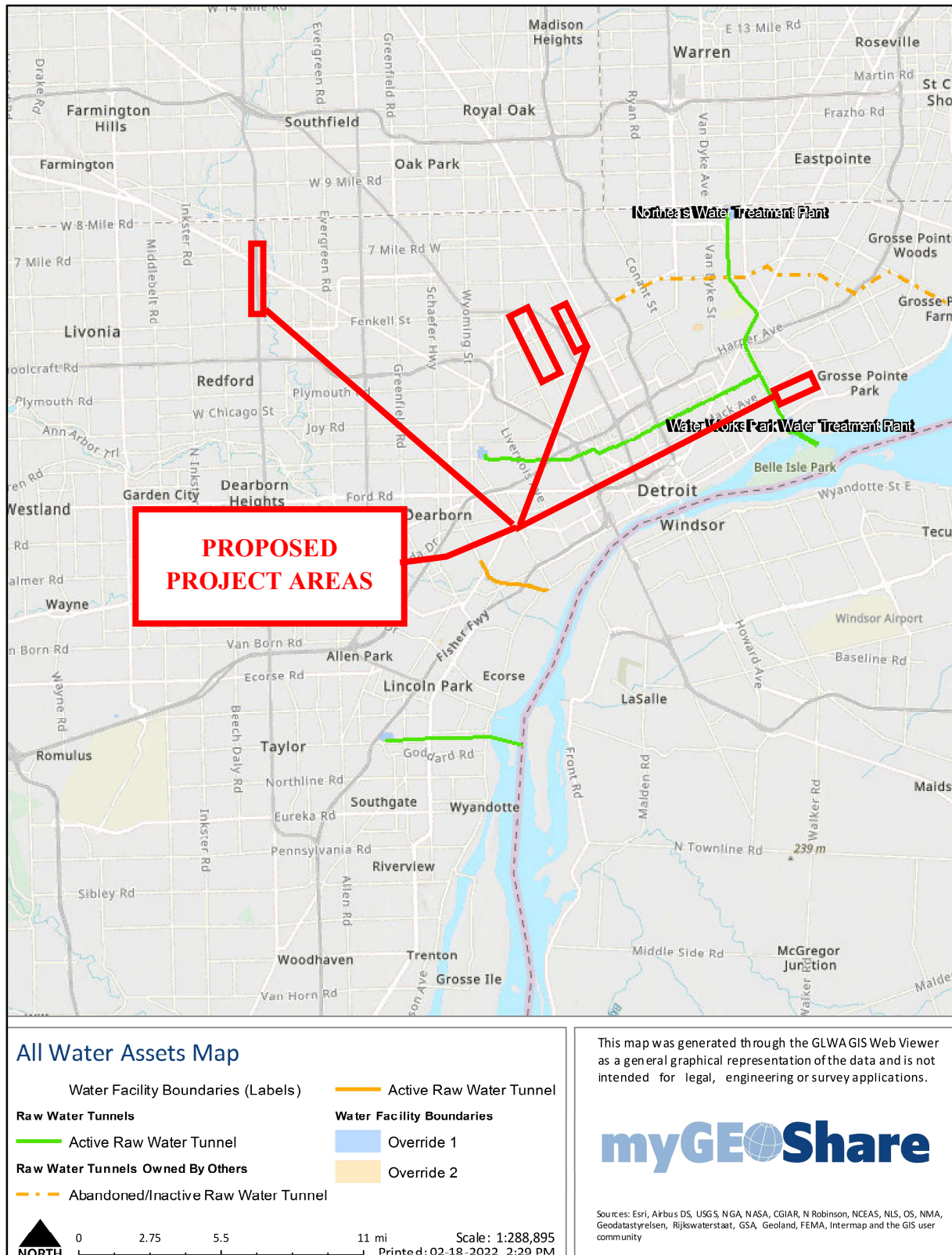


Figure 11: Detroit and Rouge River Water Intakes Locations – GLWA

1.2.2.6 Recreational Facilities

The most recent Parks and Recreation Improvement Plan document from 2017 and the City of Detroit Park Finder map were reviewed to identify any parks and outdoor recreational facilities in the project area. Based on these two resources, there are several parks and outdoor recreational facilities near the project areas. Figure 12 shows the identified City of Detroit parks in relation to the project areas from the City of Detroit Park Finder map. Table 1 summarizes the parks and outdoor recreational facilities that are closest to each of the project areas. The 2022 Parks and Recreation Improvement Plan does not indicate that Salsinger, Voight, or Eliza Howell Park will be expanded. On this basis, no impact from this project on existing developed parks or recreation areas is expected.

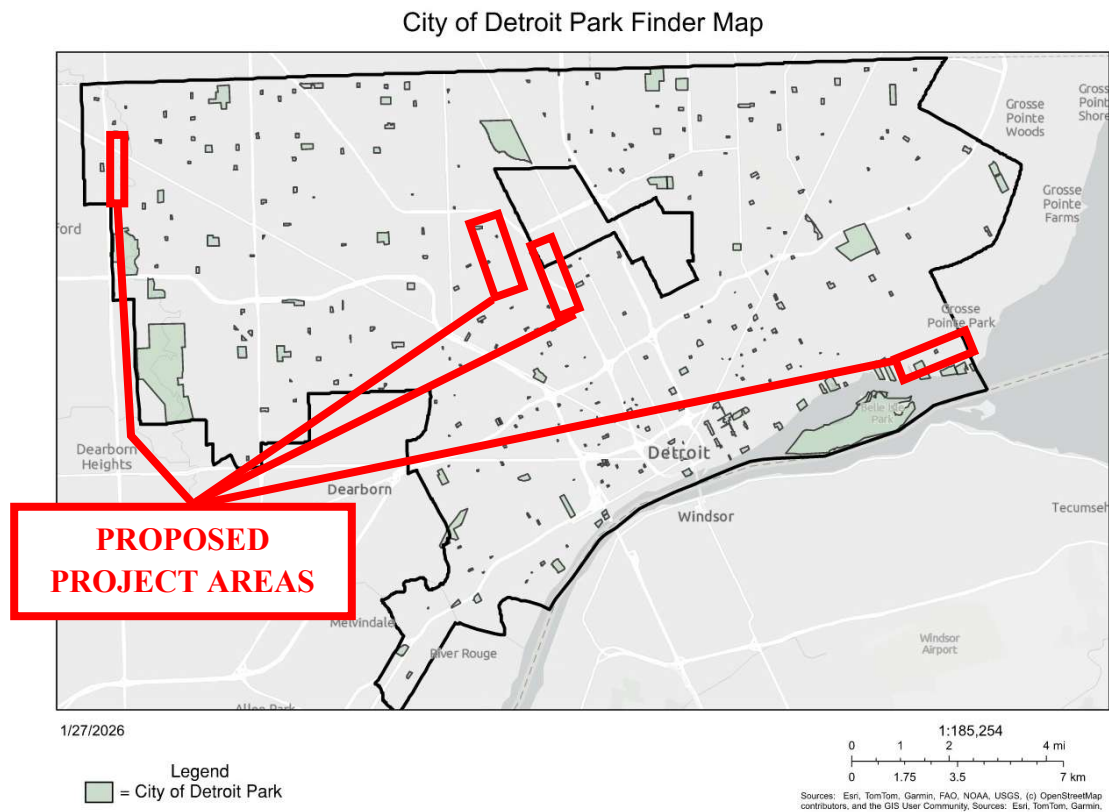


Figure 12: City of Detroit Park Finder in Relation to Project Areas

Table 1: City of Detroit Park Summary	
<i>Sewer Segment</i>	<i>Park/Outdoor Recreation Facility</i>
Linwood Sewer	Salsinger Park
Second Ave. Sewer	Voigt Park
Shiawassee Sewer	Eliza Howell Park

1.2.2.7 Topography

Due to the large geographical size of the project locations, topographic maps were obtained from the 2019 USGS Survey and are shown in Appendix C as Figures 12 through 15. The project areas are generally located in public right-of-way (ROW) throughout residential and industrial areas. Elevations throughout the area are generally consistent and only gradual changes in elevation are present.

1.2.2.8 Regional Geology and Soils

Based on published information for the Detroit Area, the regional geology of the area consists of glacial soils underlain by bedrock. The glacial soils were deposited directly by glacial ice (till), by glacial meltwater streams (glaciofluvial), or by glacial lakes (lacustrine deposits).

Based on published information from the Michigan Geological Survey Physiographic Map, the project areas reside in the Maumee Lake Plain that has soil textures that range from sandy to clayey. There are few areas that have a loam surface texture. Hydrologically, the Maumee Lake Plain is a “broad, wet plain that has been artificially drained for agriculture”.

On the basis of published data as well as site-specific data, near-surface soils generally consist of variable fill, which is underlain by native lacustrine clays that are typically very soft to medium consistency, and which occasionally contain relatively thin seams and layers of granular material. These clay layers are generally considered to be slightly over consolidated and occasionally normally consolidated. The upper surface soils have been desiccated during dry and low water periods, which results in stiffer clays than the underlying lacustrine soils. The lacustrine deposits are typically underlain by a thin layer of over consolidated glacial till that was present beneath the layers of the last ice age, consisting primarily of clay with sand, silt, and gravel. This formation is referred to locally as “hardpan” and typically overlies bedrock.

The bedrock that underlies the overburden soil for the Detroit area consists of the Dundee Limestone Formation. This formation contains artesian groundwater within it as well as hydrogen sulfide and methane gas. This aquifer is of low quality and is not used for drinking water or for any known industrial purpose.

1.2.2.9 Agricultural Resources

The project areas are primarily in public ROW, adjacent to residential and industrial properties. There are no prime or unique farmlands in the area.

1.2.2.10 Fauna and Flora

To characterize the fauna and flora in the project area and to determine if there are any environmentally sensitive habitats or any species listed as endangered, threatened, or of special concern, the design team has contacted the Michigan Natural Features Inventory (MNFI) and the U.S. Fish & Wildlife Service (USFWS).

The MNFI was contacted through the Michigan State University Extension. The MSU Extension checked the project area with a 1.5-mile buffer for rare species and unique natural features recorded in the MNFI. Several at-risk species and/or natural communities have been documented within 1.5 miles of the project location. However, the review noted that it is unlikely that adverse impacts will occur from the project. The threatened or endangered species and the special concern species and natural communities that have occurred within 1.5 miles of the project site were last observed from 1867 to 1933 and have no concerns in relation to the project. The full list of species identified can be found in Appendix C. The MNFI review also noted that several species including the Indiana Bat, Snuffbox Mussels, Northern Riffleshell Mussels, Rayed Bean Mussels, Northern Long-Eared Bat, and Round Hickorynut appear to have suitable habitat within 1.5-miles of the project area.

The USFWS Information for Planning and Consultation (IPaC) website was used to identify any species listed as federally endangered, threatened, proposed, and candidate species that may occur within the boundary of the project areas. Further review of the species in the project area determined that the project is not likely to adversely affect any of the species or their habitats. The species list and consistency letter provided by the USFWS IPaC system are provided in Appendix C.

By comparing the MNFI and USFWS review of species in the project area, it was determined that two listed bats—Indiana Bat and Northern Long-Eared Bat may fall within the project areas. Additionally, though MNFI indicated that the Eastern Massasauga Rattlesnake does not appear to have suitable habitat within 1.5 miles of the project areas, the USFWS review did identify the Eastern Massasauga as a species that may occur within the project area. The USFWS determination of impact to these species was listed as Not Likely to Adversely Affect (NLAA). The USFWS states that to protect these species, certain conservation measures must be included in the project requirements, including wildlife safe erosion controls, reporting sightings of federally-listed species, limiting temporary or permanent lighting installations for roads, parking lots, or facilities, specified tree clearing/trimming calendar restrictions, and other such actions as included in the USFWS review in Appendix C. These measures will be included in the project requirements.

1.3 Land Use in the Study Area

The project area is mostly comprised of City of Detroit Public Right of Way, industrial properties, and residential areas. According to the City of Detroit Master Plan Future Land Use and GLWA Wastewater Master Plan 2020, the future and existing land uses in the project area are described as low density residential, medium density residential, retail center, institutional, recreational, light industrial, neighborhood commercial, and thoroughfare commercial. Due to the large geographical size of the project, land use maps for the project can be found in Appendix C as Figures 16 through 21.

1.4 Population

To evaluate the current population in the project area, data available from the Southeast Michigan Council of Government (SEMCOG) 2020 Census Information was used. When applicable, the 2020 GLWA Wastewater Master Plan was used to evaluate the current population for several sewer districts. The following Tables 2 and 3 provide a summary of the GLWA service area and the direct and indirect project area populations. Note that the service area and population related to the Ashland Relief Sewer varies significantly between sanitary and storm service; both are presented below. Per SEMCOG’s 2050 Regional Forecast (approved in February 2023), population increases of approximately 6.4% are anticipated in the southeast Michigan region over the next 30 years.

Table 2 – GLWA Service Area Summary				
<i>Type</i>	<i>Service Area</i>	<i>Area (acres)</i>	<i>Population</i>	<i>Houses</i>
All	GLWA	658,374	2,861,873	1,155,754

Table 3 - Direct and Indirect Project Area Population Summary				
<i>Type</i>	<i>Service Area</i>	<i>Area (acres)</i>	<i>Population</i>	<i>Houses</i>
Directly Impact	Ashland Relief (Sanitary)	2,742	20,793	7,242
	Ashland Relief (Storm)	30,818	258,392	104,596
	Linwood	1,146	8,358	3,603
	Second Avenue	72	423	130
	Shiawassee	1,105	10,012	4,211
	Total	33,141	277,185	112,540
Indirectly Impact	Rest of City of Detroit	88,909	639,212	254,323

1.5 Economic Characteristics

The major employment industries in the City of Detroit are trades and transportation, education and health services, professional and business services, government, and manufacturing. The largest employers are Ford Motor Company, Stellantis, and General Motors. Other large employers include financial and health services companies. The 2024 median household income in Detroit was \$39,938.

1.6 Existing Facilities

The existing facilities/assets that this project consists of include the Ashland Relief, Linwood, Second Avenue, and Shiawassee Sewers. The following sections discuss additional information regarding historical information and existing conditions for each of the subject sewers.

1.6.1 Ashland Relief Sewer Existing Conditions

The Ashland Relief Sewer is located in Detroit, Michigan, and extends from the intersection of Manistique Street and Kercheval Avenue to Freud Pump Station at its downstream end. At the upstream end, during high rain events, the Ashland Relief Sewer receives flow from the Fox Creek Relief Sewer and the DWSD-owned Mack Sewer. The upstream end of the Ashland Relief Sewer consists of a junction chamber with the Fox Creek Relief and Mack Sewer. At approximately the midpoint of the Ashland Relief Sewer there is a connection to the EJRS via two 10' diameter tunnels with three 6' diameter portal holes in each. The Ashland Relief Sewer splits into two 11'-6" barrels below the EJRS before transitioning back into a 16' diameter pipe. The entirety of the Ashland Relief Sewer was constructed of concrete in 1961. The Ashland Relief Sewer is comprised of four segments, consisting of the following components:

- Segment 1: Manistique to Lakewood along Kercheval Ave.
 - 12'-6" diameter concrete sewer
 - Total distance of approximately 1,254 feet
- Segment 2: Lakewood to Algonquin along Kercheval; Kercheval to Jefferson along Algonquin
 - 16' diameter concrete sewer
 - Total distance of approximately 4,700 feet
- Segment 3: Algonquin and Jefferson Ave double barrel
 - Each barrel 11'-6" diameter concrete sewer
 - Each barrel total distance of approximately 146 feet
- Segment 4: Jefferson Ave to Freud St. along Algonquin; along Freud St. to Freud PS
 - 16' diameter concrete sewer
 - Total distance of approximately 3,068 feet

Overall, conditions in the Ashland Relief Sewer were observed to be generally good overall, with relatively low level of structural deterioration and occasional minor defects observed throughout. Typical O&M defects include dripping infiltration at joints. Structural defects generally included minor longitudinal cracks in the crown of the pipe. Additionally, there are multiple rough taps in the Ashland Relief Sewer and in the manifolds to the EJRS. The observed connections are large diameter break-in taps with rough concrete surfaces and exposed and projecting reinforcing steel.

Manholes associated with the Ashland Relief Sewer were generally noted to be of brick construction and were observed to typically be in good condition. Throughout most of the manholes, brick and mortar deterioration was typically observed. Occasional instances of mineral deposits and infiltration were observed within the manhole chimneys. Additionally, manhole steps were observed to typically be heavily corroded or missing. The Ashland Relief Sewer also has a 6" connection to a manhole that contains mechanical equipment that has heavy deterioration and no apparent current use.

1.6.2 Linwood Sewer Existing Conditions

The Linwood Sewer is located in the City of Detroit, extends from the intersection of Log Cabin St. and Puritan St. at its upstream end, and flows south where it discharges into the Joy Rd. Sewer near Linwood St. and Edison St. The Linwood Sewer receives flow from two 2'-0" diameter sewers at the upstream end and many connections along the entire length of the sewer. Historical documents indicate that several taps were installed for future connections, but the connections were observed to not have been utilized. The entirety of the Linwood Sewer was constructed in 1921. The Linwood Sewer is comprised of five segments, consisting of the following components:

- Segment 1: Log Cabin St. to Linwood St. along Puritan Ave.
 - 3'-0" x 4'-6" to 3'-4" x 5'-0" egg-shaped, brick sewer
 - Total distance of approximately 1,657 feet
- Segment 2: Puritan Ave. to Fenkell Ave. along Linwood St.
 - 5'-0" to 5'-3" diameter, brick sewer
 - Total distance of approximately 2,597 feet
- Segment 3: Fenkell Ave. to Davison St. along Linwood St.
 - 6'-6" to 7'-6" diameter, brick and concrete sewer
 - Total distance of approximately 3,970 feet
- Segment 4: Davison St. to Webb St. along Linwood St.
 - 8'-9" to 9'-6" diameter, brick sewer
 - Total distance of approximately 4,030 feet
- Segment 5: Webb St. to north of Atkinson St. along Linwood St.
 - 9'-6" diameter, brick sewer
 - Total distance of approximately 3,628 feet

Overall, conditions in the Linwood Sewer were observed to be generally fair overall, with various structural and O&M defects along its length. Typical O&M defects include dripping and running infiltration and several locations with extensive debris in the invert of the pipe. Rough taps were observed at multiple locations throughout the pipe. The observed connections are generally break-in taps with rough concrete or brick surfaces and exposed and projecting reinforcing steel, or intruding lateral connections. Structural defects generally consisted of missing bricks and spalling concrete with several locations noted as PACP Grade 5 structural defects. Several brick "block-outs" that were framed with wood were encountered. The wood framing was observed to be rotten and/or missing entirely, leaving the block-out unsecured. These block-outs may have been installed for future lateral connections but are currently deteriorating.

Manholes associated with the Linwood Sewer were generally noted to be of brick construction and were observed to typically be in good condition. Throughout most of the manholes, brick and mortar deterioration was typically observed. Occasional instances of mineral deposits and

infiltration were observed within the manhole chimneys. Additionally, manhole steps were observed to typically be heavily corroded or missing.

1.6.3 Second Avenue Sewer Existing Conditions

The Second Avenue Sewer is located in the City of Detroit, extends from the alleyway north of the intersection of Webb Ave. and Second Ave. at its upstream end, and flows south to the Joy Rd. Sewer at its downstream end. Included in the scope of this project is a related alley sewer that ranges from Hamilton Ave. to the west and Brush St. to the east and is located on the boundary of Highland Park and Detroit. The Second Avenue Sewer is comprised of four segments, consisting of the following components:

- Segment 1 (alley sewer): Hamilton Ave to Brush St. along alley north of Webb Ave (boundary of Highland Park and Detroit)
 - 12" to 22" diameter, VCP sewer
 - Constructed in 1895 (east of Woodward) and 1905 (west of Woodward)
 - Total distance of approximately 4,875 feet
- Segment 2: North of Webb Ave. to south of Lawrence St. along Second Ave.
 - 2'-4" x 3'-6" egg-shaped, brick sewer
 - Constructed in 1931
 - Total distance of approximately 2,049 feet
- Segment 3: South of Lawrence St. to South of Glynn Court along Second Ave.
 - 2'-6" x 3'-9" to 2.8' x 4'-3" egg-shaped, brick lined with CIPP sewer
 - Constructed in 1931
 - Total distance of approximately 1,009 feet
- Segment 4: Alley south of Glynn Court to Edison Ave. along Second Ave.
 - 2.8' x 4'-3" to 3.2' x 4'-9" egg-shaped, brick sewer
 - Constructed in 1931
 - Total distance of approximately 1,484 feet

Overall, conditions in the Second Avenue Sewer were observed to be generally fair overall, with various structural and O&M defects along its length. O&M defects include limited instances of dripping and running infiltration. Structural defects consisted of isolated instances of missing bricks and delaminating CIPP liner. The liner stops at multiple manholes, and at each end of the liner where it stops, gaps are present between the liner and the host pipe.

The VCP alley sewer was generally in poor to fair structural condition with several locations of cracking, deformed pipe, and rough break-in laterals.

Manholes associated with the Second Avenue Sewer were generally noted to be of brick construction and were observed to typically be in good condition. Throughout most of the manholes, brick and mortar deterioration was typically observed. Occasional instances of

mineral deposits and infiltration were observed within the manhole chimneys. Additionally, manhole steps were observed to typically be heavily corroded or missing.

1.6.4 Shiawassee Sewer Existing Conditions

The Shiawassee Sewer is located in the City of Detroit and extends from the intersection of 7 Mile Road and Shiawassee Street at its upstream end and flows south, ending at the Puritan-Fenkell CSO RTB Facility. At 7 Mile Road, the Shiawassee Sewer receives dry-weather flow from the GLWA-leased Seven Mile Sewer; the Shiawassee Sewer extends upstream of this connection but is owned by DWSD north of 7 Mile and is outside of the scope of this report.

There are several locations along the Shiawassee Sewer where sewer stubs were constructed in advance of planned storm/sanitary sewer connections and were bulkheaded until the connection was made. During document review and field investigations, it was observed that one of these stubs was never utilized, as the bulkhead was still present a short distance beyond the Shiawassee Sewer mainline. The Shiawassee Sewer is comprised of six segments, consisting of the following components:

- Segment 1: 7 Mile Rd. to Roxford Ave. along Shiawassee Dr.
 - 4'-3" to 6'-6" diameter, brick sewer
 - Constructed in 1930
 - Total distance of approximately 1,444 feet
- Segment 2: Shiawassee Dr. to Riverview St. along Roxford St.
 - 6'-6" to 6'-0" diameter, concrete sewer
 - Constructed in 1930
 - Total distance of approximately 870 feet
- Segment 3: Riverview St. to Curtis St. along N.B. Telegraph Rd.
 - 6'-9" diameter, concrete sewer
 - Constructed in 1930
 - Total distance of approximately 1,305 feet
- Segment 4: Curtis St. to McNichols Rd. along N.B. Telegraph Rd.
 - 9'-0" diameter, concrete sewer
 - Constructed in 1930
 - Total distance of approximately 2,526 feet
- Segment 5: McNichols Rd. to Diversion Structure along N.B. Telegraph Rd.
 - 10'-3" diameter, concrete sewer
 - Constructed in 1930
 - Total distance of approximately 3,105 feet
- Segment 6: Diversion Structure to the Puritan-Fenkell RTB along the Rough River
 - 12'-0" diameter, Class III/IV precast concrete sewer
 - Constructed in 1996
 - Total distance of approximately 3,170 feet

Overall, conditions in the Shiawassee Sewer were observed to be generally fair overall, with various structural and O&M defects along its length.

Typical O&M defects include dripping and running infiltration and one location with gushing infiltration. Minimal levels of debris were encountered in the Shiawassee Sewer. Structural defects consisted of isolated areas of missing bricks and spalling concrete. There were also several areas of radial cracking or deteriorated joints and several lateral connections with void space in the annulus between the lateral and the main Shiawassee Sewer.

Manholes associated with the Shiawassee Sewer were generally noted to be of brick construction and were observed to typically be in good condition. Throughout most of the manholes, brick and mortar deterioration was typically observed. Occasional instances of mineral deposits and infiltration were observed within the manhole chimneys. Additionally, manhole steps were observed to typically be heavily corroded or missing.

1.7 Fiscal Sustainability Plan

This project is for nonpoint source work, and therefore a Fiscal Sustainability Plan (FSP) is not required.

1.8 Need for the Project

The AL2S Sewers transport dry and wet weather flow to other GLWA assets including the Freud PS, Puritan-Fenkell CSO RTB, and other large diameter sewers that transport flow to GLWA's Water Resource Recovery Facility (WRRF).

The current condition of portions of the AL2S Sewers is generally fair, with defects consistent with the age of the overall conveyance system. Maintaining and repairing the sewers is necessary in continuing to allow the sewers to convey flow to the GLWA WRRF and provide relief to other components of the regional conveyance system. Structural rehabilitation of the AL2S Sewers is intended to extend their service life by an additional 30 years and allow the system to continue to provide positive impacts to the system.

The need for the project with respect to GLWA's compliance with the existing National Pollutant Discharge Elimination System (NPDES) permit, orders from enforcement agencies, water quality problems, future needs, and future environmental analysis are discussed in the following sections.

1.8.1 Compliance Status

GLWA is in compliance with the current NPDES permit. GLWA's NPDES Permit No. is MI0022802. A copy of the latest discharge permit has been attached in Appendix F.

1.8.2 Orders

The proposed work is not involved with any court orders, federal orders, or orders from state enforcement agencies.

1.8.3 Water Quality Problems

There are no known water quality issues related to the project. It is not anticipated that the project will negatively impact the water quality in the project area. Any discharges made throughout this project are within the limits of the current NPDES permit.

1.8.4 Projected Needs for Next 20 Years

As discussed in Section 1.4, populations in the study area are expected to increase over the next 20 years. Consequently, it can be expected that the additional population will result in increased residential flows in the Ashland Relief, Linwood, Second Avenue, and Shiawassee Sewers which ultimately goes to the WRRF. This project will ensure that the subject sewers are structurally in good condition to mitigate the risk of failure and continue to provide service to the entire system.

2.0 ANALYSIS OF ALTERNATIVES

This section discusses the various options that GLWA has considered to improve the subject assets as they relate to the objectives of this project, as described in section 1.8. The design team has identified five alternatives that capture the widest range of potential solutions to the identified structural problems in the Ashland Relief, Linwood, Second Ave., and Shiawassee Sewers.

- Alternative 1: Status Quo - No action
- Alternative 2: Targeted Spot Repairs
- Alternative 3: Full Structural Repair (Targeted)
- Alternative 4: Full Length, Full Structural Repair
- Alternative 5: Replacement (New Construction)

2.1 Alternative 1 – Status Quo (No Action)

In general, the approach to “do nothing” has not been considered an appropriate approach or in line with the scope of the project, as the age of the assets and the defect identification process typically yields a number of items requiring attention. However, if executing the recommended repairs is determined to not be feasible due to construction sequencing, other ongoing projects in the system that are of higher priority, or other constructability considerations, a temporary “do nothing” approach could be considered for select sewers until sequencing becomes more feasible.

2.2 Alternative 2 – Targeted Spot Repairs

A spot repair approach is generally considered when overall pipe conditions are fair to good, and observed defects are limited in quantity. Spot repairs minimize disruptions to the surface, traffic, adjacent utilities, and general operation of the asset in question, especially in comparison to more disruptive repairs such as lining. The cost for a spot repair approach is generally lower than other structural rehabilitation approaches as well. A targeted, well-executed spot repair approach can extend the service life of an asset by several decades, though typically the service life extension with this approach will be less than that which can be achieved with a full structural repair (lining) or by new construction.

The options considered for spot repair involve fixing individual defects in place, and generally consist of standard repair approaches. Such targeted spot repairs would involve such items as epoxy grouting of open cracks that may allow for loss of material; shotcrete or other applied cementitious repair of spalling joints or other deep spalls or concrete deterioration; repairing rough break-in tap connections or trimming intruding tap connections; etc. Addressing isolated defects can help to prevent further propagation of the defect (i.e., cracking, spalling, etc.) or soil infiltration through cracks or poor tap connections. Failure to address isolated defects can lead to more widespread structural deterioration that may require in-depth structural rehabilitation. Where spot repairs were considered feasible and not widespread, they were preferred over limited or full lining repairs.

In general, localized repair of defects was considered as the appropriate option for each of the subject sewers. It should be recognized that because of the age of the assets in question, additional Grade 3, 4, and 5 defects are expected to occur over the next 25 to 30 years, and as such, regular maintenance and repair would still be required as part of a standard O&M program. See also the discussion on full structural lining for a discussion of the recommended repair approach for the alley sewer associated with the Second Ave. Sewer.

2.3 Alternative 3 – Full Structural Repair (Targeted)

Targeted full structural repairs involve structurally repairing limited portions of a structure, but not the entirety of the structure. For example, in a pipeline in otherwise good condition, a short section with numerous defects or structural inadequacies could be lined with a structural cured-in-place pipe (CIPP) sleeve, spray lining, or other targeted structural repair, while leaving the rest of the pipeline as is. Alternatively, it could involve identifying which manholes (if any) are in poor condition and spray lining to restore structural integrity.

There are several limited pipe rehabilitation techniques that could be considered including CIPP sleeve lining, geopolymer spray lining, and various other applied linings (such as carbon fiber lining), or in-depth structural modifications. The considered approaches typically boast long service lives and corrosion resistance. CIPP sleeve lining is a proven technology, with several

installers located in the Detroit area. CIPP sleeve lining generally takes advantage of existing manholes, though it may require the construction of new manholes or modification of existing manholes if existing manholes are too far apart or otherwise inadequate for lining operations. Additionally, the maximum feasible diameter to use CIPP sleeve lining (for any significant length) is around 6', which the target sections of the AL2S sewers exceed with the exception of the Second Avenue Sewer and portions of the Linwood and Shiawassee sewers. Further, full flow bypass or diversion is typically required for CIPP lining, which can be cost-prohibitive for a targeted structural repair.

Applied lining such as carbon fiber linings can be applied in targeted areas, have a minimal cross-section reduction, and can be used for a full structural pipeline rehabilitation. However, the installation process is labor-intensive and proper surface preparation is critical; achieving the proper surface prep is expected to be problematic for this application under the field conditions expected. The surface preparation includes providing a smooth and dry surface to apply the lining; conditions which can be prohibitively difficult to achieve in longer lengths of old brick or concrete sewers with uneven surfaces and constant moisture/sewer flow.

Geopolymer spray lining is also a proven construction method and can be completed from existing manholes and for small or irregular sections. Similar to applied linings, surface preparation is important, but there are proven approaches to spray lining within active sewer segments that can be taken. Full flow bypass or diversion is also typically necessary for full-circumference spray lining repairs.

Similar to the limited pipe rehabilitation approaches discussed above, we consider here a similar approach to manhole rehabilitation. As has become standard practice for GLWA contracts, existing manhole frames and covers are to be replaced with new, GLWA-logo, hinged frames and covers. As part of this lid replacement, we recommend that the upper 4 to 5 feet of the manhole chimney be replaced with a precast assembly. This serves the dual purpose of addressing the regularly observed near-surface brick and mortar or concrete distress as well as maximizing the manhole access by enlarging the upper portion of the chimney. Installation of new manhole steps for the full manhole height is also recommended to replace existing, heavily deteriorated manhole steps. The conditions identified for the subject sewers can generally be repaired with the replacement of the upper 4 to 5 feet of chimney, along with targeted spot repairs to address infiltration through the manhole chimney or extensive mineral deposit buildup that extends into the main sewer line.

2.4 Alternative 4 – Full Length, Full Structural Repair

Full length, full structural repair generally involves structurally rehabilitating the asset in question by installing a new liner that does not rely on the host pipe for structural integrity. This can be done by installing a new pipe inside the host pipe (slip lining) or by lining the walls of the

host pipe with a material that does not depend on the host pipe for structural stability when complete (such as full structural CIPP or applied/sprayed structural linings). These options are discussed below, though with the exception of the alley sewer associated with the Second Ave. Sewer, are not being considered for the AL2S Sewers.

We considered four types of full length, full structural repair for the sewer segments; spray-applied structural liners (geopolymer or polyurea), CIPP lining, slip-lining with glass-fiber reinforced polymer mortar pipe (GFRPMP; i.e., Hobas or similar), and a two-part repair mortar and epoxy lining system (i.e., Madewell Mainstay or similar). These methods again boast long service lives and corrosion resistance, with the added benefit that these methods are proven approaches with available contractors located in the Detroit area. These options are described below.

GFRPMP slip lining involves the insertion of a new, structurally independent pipe within the host pipe. It requires the construction of lining shafts, which can be generally disruptive to surface activities. GFRPMP is a thin-wall pipe and is typically grouted in place once installed. A major benefit of GFRPMP is that it can be installed in sewers with active flow, provided that installation is sequenced correctly. Slip-lining will generally reduce the cross-section of the host pipe by 8 inches to more than a foot, as the slip-line pipe must be carried, pulled, jacked, or otherwise transported through the host pipe without damage. Additionally, multiple lining shafts may be required to accommodate turns or cross-section changes.

Spray-applied linings such as geopolymer or polyurea are a flexible approach to pipe rehabilitation, as they can generally conform to variations in the host pipe geometry such as cross-section changes or transitions. Spray lining can generally be installed through existing manholes, and can be completed in active sewer conditions, provided that flow can either be diverted, stored upstream in-system during the cure time, or bypassed. The best results are usually achieved when flow can be diverted upstream or bypassed and the full pipe surface perimeter prepared under generally dry conditions. As such, extensive spray lining operations will typically incorporate a bypass or other flow control measure to eliminate active flow through the work area. Surface preparation can include addressing infiltration, cleaning pipe surface, debris removal, and installing anchors to the host pipe, depending on the application. Typically, we recommend that a structural spray-applied lining must be a 360-degree repair. This is based on our experience that such linings perform significantly better in the long term if a continuous thrust-ring can be developed. In linings that have been installed over a partial cross-section (270 degrees for example), we have typically observed premature delamination and peeling at the margins, increased reflective cracking, and premature structural failure. Both geopolymers and polyurea liners typically provide excellent corrosion resistance; although, under certain extreme conditions, have been observed to perform poorly.

A very similar rehabilitation approach to single-stage spray lining, a two-part epoxy lining system can provide both structural and corrosion resistance. Products like Madewell Mainstay consist of a high-strength restoration mortar and epoxy corrosion barrier. The restoration mortar provides structural rehabilitation to deteriorated concrete and brick structures, and the epoxy barrier provides long-term corrosion resistance. The epoxy is applied directly to the restoration mortar, ensuring that the bond between the materials is sound throughout the full installation and preventing the epoxy lining failure often observed when epoxy is applied directly to the host pipe or structure. Similar to single-stage spray applied linings, we recommend a 360-degree liner for two-part lining systems. The major advantage of two-part epoxy lining systems is increased corrosion protection, while the major disadvantage involves increased complexity for preparation and for installing in active flow conditions. The conditions within active sewers can make the necessary bonds between repair mortar and host pipe, and between epoxy topcoat and repair mortar very difficult to achieve.

CIPP lining generally requires less surface level disruption than slip lining with GFRPMP, as CIPP lining can often be accomplished through existing manholes or small shafts. Lining with CIPP also generally leads to less reduction in cross-section, as the CIPP liner expands against the walls of the host pipe. However, lining large diameter pipes (greater than about 6 to 7 feet) becomes increasingly impractical due to the difficulty in bypassing flow and then installing and fully curing the CIPP liner together with the associated risk held by the contractor. CIPP lining can be accomplished in non-circular pipes and can typically tolerate some level of ongoing infiltration and variations in pipe surfaces, especially if installed with a pre-liner.

As noted above, though full structural lining is not considered necessary for the majority of the AL2S sewers, it is being proposed for the small diameter (12" to 22") alley sewer associated with the Second Ave. Sewer. This alley sewer is over 120 years old and shows defects consistent with its age. To extend the service life for a minimum of 30 years as per the project goals, we are recommending that the nearly 5000 feet of alley sewer be structurally rehabilitated by means of CIPP lining.

2.5 Alternative 5 – Full Replacement (New Construction)

Full replacement was not considered structurally necessary in any of the AL2S sewers.

3.0 SELECTED ALTERNATIVE

3.1 Alternative Overview

The following sections discuss the selected alternatives for the Ashland Relief, Linwood, Second Avenue, and Shiawassee Sewers.

3.1.1 Ashland Relief Sewer

Localized repair of defects was considered as the appropriate alternative the Ashland Relief Sewer. This approach generally addresses all of the Grade 3, 4, and 5 defects and/or other conditions encountered that may have an impact on service of life over the next 30 years. Spot repairs generally include infiltration sealing with chemical grout, rough tap repair, crack repairs, deep concrete repairs, joint repairs, etc. It is recommended to remove debris in the 11'-6" diameter pipes below Jefferson Avenue and heavy obstructions that may not be flushed away with typical flow conditions. There is one 6" lateral connection which we recommend removing deteriorated mechanical equipment and be abandoned as well as abandon one manhole at Algonquin and Jefferson

It is recommended to replace the manholes with new manhole frames and covers to facilitate future access and repair work. Ashland Relief Sewer has twelve manholes.

3.1.2 Linwood Sewer

Localized repair of defects was considered as the appropriate alternative for the Linwood Sewer. This approach generally addresses all of the Grade 3, 4, and 5 defects and/or other conditions encountered that may have an impact on service of life over the next 30 years. Spot repairs generally include infiltration sealing with chemical grout, rough tap repair, deteriorated brick and mortar repairs, epoxy crack repairs, deep concrete repairs, joint repairs, etc. It is also recommended to remove debris meeting or exceeding PACP Grade 3 classification. It is recommended to abandon the bulkheaded stubs at the inside face of the Linwood Sewer. Additional recommended improvements to the Linwood Sewer include the construction of three new manholes to improve sewer access both for this project and for future O&M.

It is recommended to replace the eighteen manholes with new manhole frames and covers to facilitate future access and repair work as well as installation of three new manholes to decrease manhole segment lengths for future access and maintenance.

3.1.3 Second Avenue Sewer

The Second Avenue Sewer was noted to be in generally fair condition from a structural perspective with multiple Grade 3, 4 and 5 defects. The associated alley sewer was noted to be in similar condition. Localized repair of defects was considered the appropriate alternative for the Second Avenue Sewer. This approach generally addresses all the Grade 3, 4, and 5 defects and/or other conditions encountered that may have an impact on service of life over the next 30 years. Spot repairs generally include infiltration sealing with chemical grout, rough tap repair, deteriorated brick and mortar repairs, crack repairs, deep concrete repairs, joints repairs, etc. Recommended structural repairs also include repairs for approximately 1,007 feet of delaminated CIPP liner, which includes restoring bulkheads between the host pipe and liner and filling the annulus with lightweight grout. As noted in the discussion of repair options above, it is

recommended that the alley sewer be CIPP-lined to address the observed structural defects and to extend the service life of that particular asset.

It is recommended to replace the twenty manholes with new manhole frames and covers to facilitate future access and repair work.

3.1.4 Shiawassee Sewer

Localized repair of defects was considered the appropriate alternative for the Shiawassee Sewer. This approach generally addresses all the Grade 3, 4, and 5 defects and/or other conditions encountered that may have an impact on service of life over the next 30 years. Spot repairs generally include infiltration sealing with chemical grout, rough tap repair, deteriorated brick and mortar repairs, crack repairs, deep concrete repairs, joints repairs, etc. It is recommended to abandon the bulkheaded stubs at the inside face of the Linwood Sewer.

It is recommended to replace the sixteen manholes with new manhole frames and covers to facilitate future access and repair work. It is also recommended to install storm-surge manhole cover over the manholes subject to Rouge River inundation

3.2 Project Schedule

The design of this project is ongoing, and construction is anticipated to begin in March 2027. Project completion is expected in May 2029. A summary construction schedule (based on the Basis of Design Report) as shown in figure 13 on the following page.

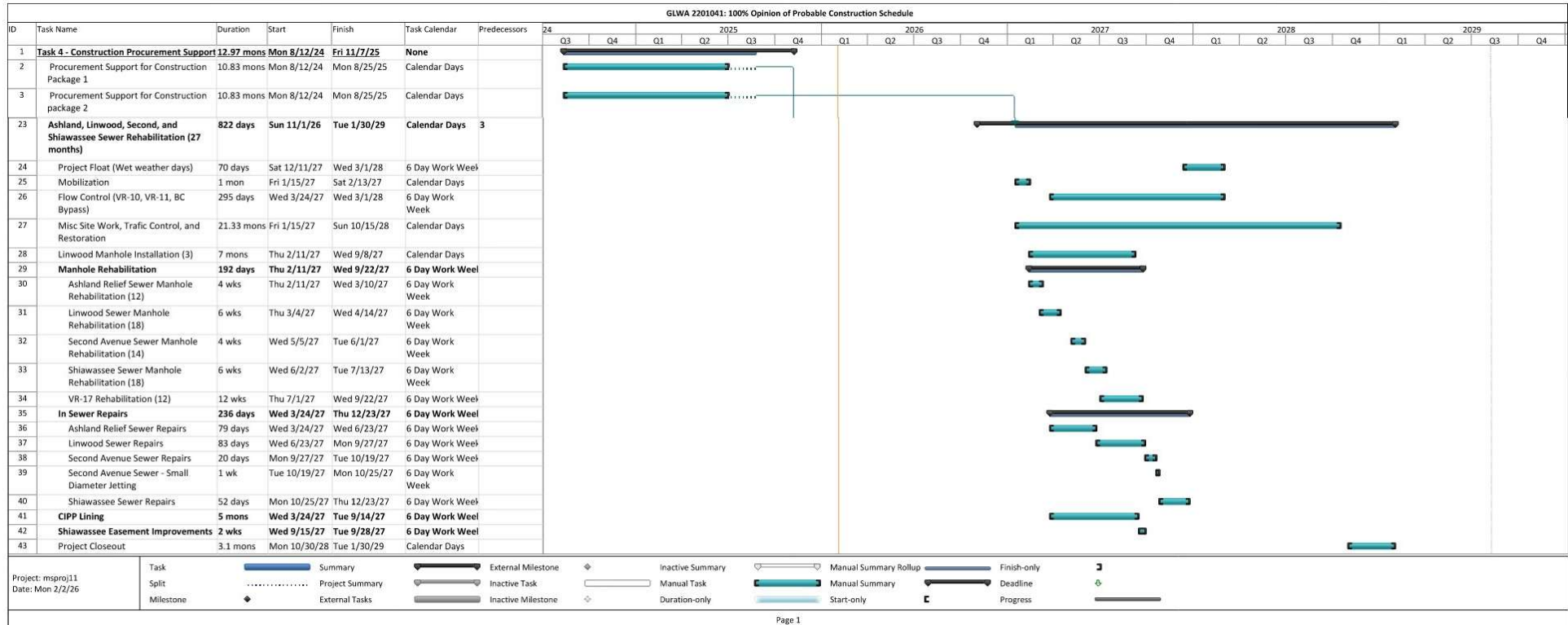


Figure 13: Construction Schedule

3.3 Engineer’s Opinion of Project Cost

For the construction of the repairs throughout the AL2S sewers, the AACE Level 4 Opinion of Cost is \$14,119,781 which includes a 10% contingency. A preliminary project cost breakdown is shown in Figure 14. On this basis, \$14.5M is being sought through SRF Funding.

Ashland, Linwood, Second Avenue and Shiawassee Draft Final I

Bid Item No.	Bid Quantity	Bid Units	Description	Unit Price	Bid Price
A. Lump Sum Items					
1	1	LS	Mobilization	N/A	\$611,246
2	1	LS	Flow Control	N/A	\$750,000
3	1	LS	Misc. Site Work	N/A	\$325,000
4	1	LS	Traffic Control	N/A	\$200,000
5	1	LS	Shiawassee Sewer Manhole Platform	N/A	\$45,000
6	1	LS	Shiawassee Easement Clearing and Gate Install	N/A	\$45,000
7	1	LS	Shiawassee VR-17 Hatch Replacement	N/A	\$50,000
8	1	LS	Lining Access Manhole (Second Ave.)	N/A	\$100,000
9	1	LS	CIPP Lining Preparation	N/A	\$40,000
10	1	LS	SRF Compliance	N/A	\$500,000
SUB-TOTAL LUMP SUM AND ALLOWANCE ITEMS (1 to 9) =					\$2,666,246
B. Unit Price and Allowance Items					
11	120	Days	Shutdown Days	\$1,500	\$180,000
12	250	SF	Deep Concrete Repair	\$480	\$120,000
13	250	LF	Open Joint Repair	\$525	\$131,250
14	75	LF	Epoxy Crack Repair	\$200	\$15,000
15	75	SF	Tuckpointing Deteriorated Mortar	\$100	\$7,500
16	175	SF	Deteriorated Brick Repairs	\$270	\$47,250
17	50	SF	Remove Mineral Deposits and Roots	\$80	\$4,000
18	200	TONS	Remove Debris	\$1,150	\$230,000
19	28000	GAL	Seal Infiltration with Chemical Grout	\$175	\$4,900,000
20	29	EACH	Repair Rough Taps ≤ 24"	\$1,675	\$48,575
21	1	EACH	Repair Rough Taps > 24" to <48"	\$2,738	\$2,738
22	2	EACH	Repair Rough Taps ≥ 48"	\$3,800	\$7,600
23	1	EACH	Abandon 5' Connection (Shiawassee)	\$17,000	\$17,000
24	1	EACH	Abandon 3'-9" Connection (Linwood)	\$10,000	\$10,000
25	1	EACH	Abandon 3'-9" Connection (Linwood)	\$12,400	\$12,400
26	1077	LF	15" to 22" Sewer Cleaning and CCTV (Second Ave)	\$18	\$19,386
27	1007	LF	CIPP Annulus Grouting (Second Ave)	\$110	\$110,770
28	8	EACH	Open Cut Pre-Lining Repair (HP Laterals Sewer)	\$35,000	\$280,000
29	1825	LF	12" Precon Clean and CCTV (HP Laterals Sewer)	\$10	\$18,250
30	1550	LF	15" Precon Clean and CCTV (HP Laterals Sewer)	\$11	\$17,050
31	950	LF	18" Precon Clean and CCTV (HP Laterals Sewer)	\$12	\$11,400
32	550	LF	22" Precon Clean and CCTV (HP Laterals Sewer)	\$14	\$7,700
33	1825	LF	12" CIPP Line and Postcon CCTV (HP Laterals Sewer)	\$69	\$125,925
34	1550	LF	15" CIPP Line and Postcon CCTV (HP Laterals Sewer)	\$83	\$128,650
35	950	LF	18" CIPP Line and Postcon CCTV (HP Laterals Sewer)	\$128	\$121,600
36	550	LF	22" CIPP Line and Postcon CCTV (HP Laterals Sewer)	\$180	\$99,000
37	1	EACH	Abandon Manhole and Restore Road (Ashland Relief)	\$21,500	\$21,500
38	3	EACH	New Manhole Installation (Linwood)	\$700,000	\$2,100,000
39	62	EACH	Manhole Frame and Cover Replacement	\$15,000	\$930,000
40	2	EACH	Manhole Spray Lining	\$16,500	\$33,000
41	15	EACH	Tree Removal (6in to 18in)	\$825	\$12,375
42	NTE	N/A	Provisional Allowance	N/A	\$400,000
Subtotal Unit Price Items (11 to 41)					\$10,169,919
TOTAL BID (1 TO 41) =					\$12,836,164
10% Contingency (AACE Level 1) =					\$1,283,616
OVERALL TOTAL =					\$14,119,781

Figure 14: Construction Schedule

3.4 Authority to Implement the Proposed Project

GLWA is a regional water and wastewater provider responsible for improving, enlarging, extending, financing, and operating a water supply and wastewater system and has the authority to implement this project. GLWA is legally, financially, and managerially responsible for the AL2S Sewers, and will be the loan applicant for this project.

3.5 User Costs

The cost per user is determined using the following equation:

$$A = PW \times \left[\frac{i \times (1 + i)^n}{(1 + i)^n - 1} \right]$$

Where: A =Equivalent Annual Cost

PW =Present Worth=Project Cost = \$14,119,781

i =SRF Interest Rate=2.5%

n =SRF Term Length = 20 years

The equivalent annual cost is \$905,743. Based on SEMCOG projections, the 2020 GLWA WWMP anticipates a service area containing approximately 2.9 million residents in the next 20 years and based on the U.S. Census Bureau, the number of persons per household in Detroit from 2020 to 2024 was 2.43. Therefore, the estimated number of households that the GLWA service area contains is approximately 1.18 million.

The estimated total project cost of \$14,500,000 will be incorporated into the regional system revenue requirement and allocated to all member partners through the Sewer charges methodology process. Therefore, the estimated cost per household has been determined to be less than \$0.70 per year.

3.6 Useful Life

The AL2S Sewers repairs are being designed for a service life extension of 25 to 30 years.

4.0 EVALUATION OF ENVIRONMENTAL IMPACTS

The following sections evaluate the beneficial impacts and the potential direct, indirect, and total environmental impacts that this project may have on the natural environment. Generally, the project is located within public ROW, and limited impacts to the natural environment are expected. The natural setting of the environment was discussed in detail in Section 1 where it was determined that no adverse effects were likely to result from the construction of the project.

4.1 Direct Impacts

Construction of the AL2S Sewers Rehabilitation Project is not expected to have an adverse effect on historical, archaeological, geographic, or cultural areas, as the construction activities will mostly occur underground and will require minimal disturbance of the project area soils at areas involving surface structures (i.e., manholes). The project will not affect the water quality of the area, air quality, wetlands, endangered species, wild and scenic rivers, or unique agricultural lands.

4.2 Indirect Impacts

Indirect impacts are those caused by the proposed project that will eventually be removed with time and distance. These impacts are often seen when the project increases growth of residential or commercial developments. The project is in areas that are already developed and involves the

structural rehabilitation of existing assets, so changes to land use and the rate, density, or type of developments in the project area are not expected. Additionally, the water quality, natural environment, and cultural environment are not expected to see any adverse impacts from this project. Most of the project will be completed below ground, and above-ground areas will be restored to their pre-construction condition.

4.3 Cumulative Impacts

Improved reliability, efficiency, and the ability to safely convey stormwater and sanitary flows to the WRRF are the primary cumulative beneficial impacts anticipated from the implementation of the AL2S Sewers Rehabilitation Project. If the structural defects identified in the AL2S Sewers are neglected, we expect that defects will continue to get deteriorate, which could result in loss of service, negative upstream hydraulic impacts (surface and basement flooding), and increased sanitary and combined sewer overflows.

5.0 MITIGATION

This section discusses mitigation strategies that will be taken for adverse impacts that were identified in Section 4.

5.1 Mitigation of Short-Term Construction Impacts

Short term adverse impacts (i.e., nuisance) due to construction activities are expected and cannot be avoided. However, the construction contract will include methods for noise control, dust control, odor control, and soil erosion and sedimentation control. Noise disruptions can be avoided by scheduling work hours to avoid noise in the early morning and late evening. A soil erosion and sedimentation control plan will be developed and will include dust control methods. The construction contract will also include traffic control plans and a safety plan to mitigate personnel-related hazards. The contractor will be required to dispose of manhole rehabilitation spoils only at approved disposal sites. Following all construction activities, roadways, sidewalks, utilities, and greenbelt areas will be restored to their pre-construction condition.

5.2 Mitigation of Long-Term Impacts

Long term adverse impacts are not anticipated from this project. Site restoration will be completed at all locations affected by construction and permanent site modifications will be completed at all manhole locations that will be rehabilitated.

5.3 Mitigation of Indirect Impacts

This project is not anticipated to have any indirect impact on new development or population growth in the project area.

6.0 PUBLIC PARTICIPATION

The design team has reached out to any necessary stakeholders, municipalities, and authorities having jurisdiction (AHJs) that are in the direct alignment of various sewers. The design process of the project has included input and design requirement from AHJs along the sewer alignments. Additionally, GLWA plans to hold a public hearing prior to the submittal of the final project plan to allow the general public to comment on the project. Other public participation includes reaching out to the THPO for all 12 federally recognized Indian tribes in Michigan.

6.1 Public Hearing Advertisement

A public hearing is scheduled for April 22, 2026, and has been advertised to solicit public feedback on the draft project plan. A transcript of the public meeting will be provided in Appendix E for the final project plan.

6.2 Public Hearing Transcript

The public hearing transcript will be provided in Appendix E of the final Project Plan report.

6.3 Public Hearing Contents

The PowerPoint presentation that will be shown during the public (currently scheduled for April 22, 2026) will be provided in Appendix E of the final Project Plan report.

6.4 Public Hearing Comments

Reponses and questions received during/after the public hearing will be provided in Appendix E of the final Project Plan report.

6.5 Adoption of the Project Plan

The resolution from GLWA to formally adopt the project plan and implement the selected alternative will be included in Appendix E of the final Project Plan report.